CLAIMS

1. Optical fiber comprising:

- a central core (1);
- a first annular region (ra) surrounding the central core (1);
- a second annular region (rb) surrounding the first annular region (ra) and comprising medium-size cavities (3) the cross section whereof remains strictly between a given first threshold and a given second threshold strictly higher than the first threshold;
- a third annular region (rc) surrounding the second annular region (rb) and comprising large cavities (4) the cross section whereof remains strictly above the second threshold;

characterized in that, in a cross section of the optical fiber:

- any radius that goes from the center of the core towards the exterior of the optical fiber encounters at least either a medium-size cavity (3) in the second annular region (rb) or a large cavity (4) in the third annular region (rc); and
- the average distance between the outer perimeter (Ca) of the second annular region (rb) and the inner perimeter (Cb) of the third annular region (rc) is less than half the average dimension of a large cavity (4).

2. Optical fiber according to claim 1, characterized in that, in a cross section of the optical fiber, the average distance between the outer perimeter (Ca) of the second annular region (rb) and the inner perimeter (Cb) of the third annular region (rc) is less than one quarter the average dimension of a large cavity (4).

3. Optical fiber according to either of the preceding claims, characterized in that the first annular region (ra) comprises small cavities (2) the cross section whereof remains strictly below the first threshold.

4. Optical fiber according to claim 3, characterized in that, in a cross section of the optical fiber, when any radius that goes from the center of the core toward the exterior of the optical fiber sweeps out an angular sector between two medium-size cavities (3) in the second annular region (rb) it encounters at least one cavity (2, 3) either in the second annular region (rb) or in the first annular region (ra) over at least a

portion of the angular sector that it sweeps out.

5. Optical fiber according to claim 4, characterized in that, in a cross section of the optical fiber, the average distance between the outer perimeter of the first annular region (ra) and the inner perimeter of the second annular region (rb) is less than half the average dimension of a medium-size cavity (3).

6. Optical fiber according to any one of the preceding claims, characterized in that at least ten of the large cavities (4) in the third annular region (rc) are in the same annular layer and each has a ratio between its greatest dimension and the distance from the center of the cavity (4) to the center of the core that is greater than 0.3

7. Optical fiber according to claim 6, characterized in that at least ten of the medium-size optical cavities (3) in the second annular region (rb) are in the same annular layer and angularly offset relative to the large cavities (4) in such a manner as to face the spaces (e) between the large cavities (4).

8. Optical fiber according to any one of the preceding claims, characterized in that the space (e) between two contiguous large cavities (4) in the third annular region (rc) is less than the wavelength at which the optical fiber is used.

9. Optical fiber according to any one of the preceding claims, characterized in that the second annular region (rb) and the third annular region (rc) are circular and the first annular region (ra) is hexagonal.

10. Optical fiber according to any one of the preceding claims, characterized in that, in a cross section of the optical fiber, the greatest dimension ($\varnothing_{ext}$) of the whole of the structure of the optical fiber is less than 30 μm.

11. Optical fiber according to claim 10, characterized in that, in a cross section of the optical fiber, the greatest dimension ($\varnothing_{ext}$) of the whole of the structure of the optical fiber is less than 25 μm.

12. Optical fiber according to claim 11, characterized in that, in a cross section of the optical fiber, the greatest dimension ($\varnothing_{ext}$) of the whole of the structure of the optical fiber is less than 20 μm.

13. Optical fiber according to any one of the preceding claims,

characterized in that cavities (2) in the first annular region (ra) are disposed in such a manner that the effective area of the optical fiber is less than 10 μm^2.

14. Optical fiber according to claim 13, characterized in that cavities (2) in the first annular region (ra) are disposed in such a manner that the effective area of the optical fiber is less than 5 μm^2.

15. Optical fiber according to any one of the preceding claims, characterized in that cavities (2) in the first annular region (ra) are disposed in such a manner that the absolute value of the chromatic dispersion of the optical fiber remains less than 3 ps/nm.km from 1530 nm to 1570 nm.

16. Optical fiber according to claim 15, characterized in that cavities (2) in the first annular region (ra) are disposed in such a manner that the absolute value of the chromatic dispersion of the optical fiber remains less than 3 ps/nm.km from 1500 nm to 1625 nm.

17 Optical fiber according to either claim 15 or claim 16, characterized in that cavities (2) in the first annular region (ra) are disposed in such a manner that the absolute value of the chromatic dispersion of the optical fiber at 1550 nm remains less than 1 ps/nm.km.

18. Optical fiber according to claim 17, characterized in that cavities (2) in the first annular region (ra) are disposed in such a manner that the absolute value of the chromatic dispersion of the optical fiber remains less than 1 ps/nm.km from 1500 nm to 1625 nm.

19. Optical fiber according to any one of the preceding claims, characterized in that cavities (2) in the first annular region (ra) are disposed in such a manner that there is a zero dispersion wavelength from 1530 nm to 1570 nm.

20. Optical fiber according to any one of the preceding claims, characterized in that cavities (2) in the first annular region (ra) are disposed in such a manner that the distribution of the cavities (2) in the first annular region (ra) features at most two axial symmetries.

21. Optical fiber according to any one of the preceding claims, characterized in that the core (1) is doped with a rare earth.

22. Laser cavity comprising an optical fiber according to claim 19.

23. Amplifier comprising an optical fiber according to claim 19.

24. Optical fiber according to any one of claims 1 to 21, characterized in that the core is doped with one or more of the elements germanium, phosphorus, lead, bismuth, lithium and niobium.

25. Raman amplifier device comprising an optical fiber according to claim 24.

26. Wavelength converter device comprising an optical fiber according to any one of claims 1 to 18.

27. Wavelength demultiplexer device comprising an optical fiber according to any one of claims 1 to 18.

28. Optical regenerator device for optical signals, comprising an optical fiber according to any one of claims 1 to 18.

29. Optical filter device including a saturable absorber and comprising an optical fiber according to any one of claims 1 to 18.

30. Optical fiber comprising:

- a central core (1);
- cladding (rb and rc) surrounding the central core (1) and comprising cavities (3, 4);

and having, from 1530 nm to 1570 nm:

- an effective area less than or equal to 10 μm^2;
- an absolute value of chromatic dispersion less than 3 ps/nm.km;

characterized in that the cladding of the optical fiber comprises fewer than 70 cavities disposed in such a manner that the overall attenuation of the optical fiber remains less than 10 dB/km.

31. Optical fiber according to claim 30, characterized in that the cladding of the optical fiber comprises fewer than 50 cavities.

32. Optical fiber according to claim 6, characterized in that there are 12 large cavities (4) in the same annular layer in the third annular region (rc).

33. Optical fiber according to claim 7 or claim 32, characterized in that there are 12 medium-size cavities (3) in the same annular layer in the second annular region (rb).